ABSTRACT

Geophysical and paleoseismic investigation of the Commerce geophysical lineament at Holly Ridge, Idalia, Missouri

John N. Baldwin' and Andrew D. Barron' and James B. Harris[2]

William Lettis &Associates, Inc

1777 Botelho Drive, Suite 262

Walnut Creek, CA 94596

(925) 256-6070; (925) 2S6-6076 (fax)

Email: baldwin@lettis.com

[2]Millsaps College

Geology Department

Jackson, Mississippi, 39210

Award # 01HQGR0055

The Commerce geophysical lineament (CGL), a 400-km-long, 5-to 10-km-wide, NE-trending magnetic and gravity anomaly, extends from central Arkansas to southern Illinois, and is associated with diffuse contemporary microseismicity. In the Bloomfield Hills of SE Missouri, geomorphic mapping, acquisition of seismic reflection data and excavation of paleoseismic trenches near Idalia, Missouri (south Holly Ridge site) provide evidence of late Pleistocene to early Holocene faulting that is coincident with the surface projection of the CGL. Interpretation of seismic reflection data acquired across the Bloomfield Hills and the site show near vertical faults extending across the Tertiary/Cretaceous, and Quaternary/Tertiary boundaries, respectively. These faults coincide with near-surface faulting exposed at north Holly Ridge and in trenches at the south Holly Ridge site. Four trenches excavated at the south Holly Ridge site exposed Tertiary deposits and Plio-Pliestocene reworked Mounds gravel. The Sangamon Geosol is developed on these Eocene to Pliocene-aged deposits. These deposits are either overlain by or in fault contact with Pleistocene Peoria Loess. In addition, the trenches exposed late Pleistocene to early Holocene colluvium. and Holocene alluvium. At least two soils developed in Peoria Loess-derived colluvium. are faulted and folded across the escarpment with a minimum and maximum vertical separation of 3.5 and 5 m, respectively. The NE-striking faults are near-vertical and offset loess and colluvium. The apparent coincidence of near-vertical faults interpreted from shallow seismic reflection profiles with near-surface faulting at the Holly Ridge sites strongly suggests that the deformation is of primary tectonic origin. If so, thermoluminescence data and soils developed in the Peoria Loess indicate that the deformation occurred during late Pleistocene to early Holocene. In addition, the stratigraphic and structural relations exposed in the trenches support at least two surface-deforming events since the late Pleistocene to early Holocene.